GENDER, RELATIONSHIP POWER, AND HYPOTHALAMIC–PITUITARY–ADRENAL REACTIVITY TO COUPLE CONFLICT

by

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ABSTRACT

The present study investigates how individuals' gender and their perceptions of power in romantic relationships relate to hypothalamic-pituitary-adrenocortical (HPA) activity during and after a conflict with their romantic partner. We assessed HPA activity (via salivary cortisol) in 120 same-sex and heterosexual couples before, during, and after a laboratory assessment of couple conflict. Women in both same-sex and heterosexual couples showed greater HPA reactivity to conflict and poorer HPA recovery from conflict, independent of their perceptions of power in their relationship. Gender differences in conflict reactivity were greatest among individuals whose partners reported having low power. Among both women and men, those whose partners reported taking on fewer household responsibilities had greater baseline HPA activity. Individuals in same-sex couples had greater HPA conflict reactivity and poorer conflict recovery than individuals in heterosexual couples. The findings have implications for investigating power, gender, and social marginalization as influences on health-related processes in couples.

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INTRODUCTION

Gender, Relationship Power, and HPA Reactivity to Couple Conflict

Romantic relationships have many health benefits but also come with risk. Research shows these risks and benefits affect men and women differently, such that men show more health benefits and fewer health risks associated with romantic relationships than do women (Kecolt-Glaser & Newton, 2001). One domain where these differences appear is stress-related neuroendocrine activation. Women experience greater neuroendocrine reactivity to relationship conflict and poorer recovery from such conflict in comparison to men (Kecolt-Glaser & Newton, 2001; Morell & Apple, 1990; Smith et al., 1998). One potential explanation for this discrepancy is women typically have less power in their relationships than do men, which may impact the relationship strategies they use during conflict, their affective response to conflict, and attendant physiological processes (Wanic & Kulic, 2011).

Regrettably, same-sex couples have been largely ignored in this research area. In same-sex couples, power differentials between partners cannot be attributed to gender differences. Hence, examining the contributions of gender and power to neuroendocrine reactivity to conflict in *both* same-sex and other-sex couples allows us to determine whether previously documented gender differences in conflict reactivity are attributable to power differentials. In the present study, 120 same-sex and heterosexual couples completed a laboratory assessment of couple conflict, during which their hypothalamic-

pituitary - adrenocorticol (HPA) activity was assessed via salivary cortisol, and we examine how both gender and perceptions of relationship power – on the part of individuals themselves *and* their partners – relate to cortisol reactivity to romantic conflict.

Gender and Reactivity to Couple Conflict

Negative affect experienced during relationship conflict is associated with heightened cardiovascular and endocrine reactivity (Broadwell & Light, 1999; Kiecolt-Glaser et al., 1996; Kiecolt-Glaser et al., 1997). Over time, heightened reactivity to conflict can expose partners to cumulative health risks (Robles & Kiecolt-Glaser, 2003; Ryff et al., 2001). These risks are greater for women than for men (Kiecolt-Glaser & Newton, 2001). Laboratory studies have found women experience greater cardiovascular and neuroendocrine reactivity to relationship conflict than do men (Morell & Apple, 1990; Smith et al., 1998). This increased reactivity may explain why marital distress is more strongly correlated with negative health outcomes among women than among men (Levenson, Carstensen, & Gottman, 1994) and why marriage provides less protective health benefits for women than men overall (Kiecolt-Glaser & Newton, 2001). Researchers have proposed several theories to account for these gender differences, including the possibility women are socialized to be more relationally oriented than men. Historically, women have been found to be more attentive to relationship functioning than their male partners, and have reported working harder to address marital difficulties and maintain relationship quality (Nolen-Hoeksema & Jackson, 2001). This demanding effort may be draining over the long-term, ultimately reducing women's health benefits

from marriage (Strazdins & Broom, 2004). Women's heightened relational orientation might also increase their sensitivity to relationship conflict, given that a strong relational orientation might lead individuals to be particularly affected by the emotions and behaviors displayed by their partner during a conflict (Kiecolt- Glaser and Newton, 2001).

The Role of Power

Another possibility is gender differences in responses to couple conflict are "standing in" for power differentials in the couple, given that women have historically had less social- structural power than their male partners (Wanic & Kulic, 2011). Previous research suggests low-power individuals may be highly sensitive to the negative affect that characterizes interpersonal conflict. In studies of adults (Ellyson, Dovidio, & Fehr, 1981) and children (Anderson & Willis, 1976), low-power individuals gaze more at those of elevated power and status, and show an increased attention to social information that reveals thoughts and feelings of higher-power individuals (Snodgrass et al., 1998). Within intimate relationships, the lower- power partner may be particularly motivated to maintain adequate relationship quality, and the negative consequences of conflict are likely to be higher, potentially leading them to show greater reactivity to conflict. Research indicates over the lifespan, individuals who perceive themselves to have low power, perceive ambiguous events as more threatening (Keltner, Gruenfeld, & Anderson, 2003), and report higher levels of negative moods, guilt, and depression (Hecht, Inderbirtzen, & Bukowski, 1998).

Historically, husbands have had more power in their relationships than their wives

(Bernard, 1972; Peplau & Campbell, 1989; Sprecher & Felmlee, 1997), reflecting the different degrees of power men and women have enjoyed in society at large. Longstanding gender stereotypes posit men should adopt the powerful position of providing financially for their families and take responsibility for major decisions, whereas women should adopt the less powerful position of maintaining the home and caring for the children. Although few contemporary heterosexual couples strictly conform to such "male breadwinner" models, these long-standing ideological norms continue to persist and influence distributions of power and decision-making (Brines, 1994). Beyond the influence of stereotypes, men continue to enjoy greater societal power in a wide range of public institutions, and continue to earn considerably more than women for comparable work (U.S. Bureau of Labor Statistics, 2009). This potentially increases men's power within their close relationships because men's increased occupational and economic status allows them to rely less on their female partner for resources. Hence, it is plausible that women's tendency to show greater physiological reactivity to couple conflict is actually attributable to their low-power status in the relationship, rather than their gender.

The best way to determine whether this is the case is to compare the role of gender *and* power in reactivity to couple conflict among *both* same-sex and heterosexual couples. Research has found same-sex and heterosexual couples are largely similar with regard to basic relationship processes (Gottman et al., 2003; Kurdek, 2006; Roisman et al., 2008); hence, factors influencing reactivity to conflict are likely to be similar in both couple types. Yet one area in which same- sex couples differ is the uncoupling of gender differences from power differences. Same-sex couples often prioritize equality in their

relationships (Peplau & Fingerhut, 2007), but notable power differentials still emerge. Peplau and Cochran (1980) found that over 60% of gay couples and around 40% of lesbian couples reported their relationship was not exactly equal. Reilly and Lynch (1990) reported similar findings: 40% of their lesbian respondents characterized their relationship as unequal in power. In an earlier study by Harry and DeVall (1978), 40% of gay men reported unequal power in their relationship. Yet unlike heterosexual couples, power differentials in same-sex couples cannot align with gender differences, given that both partners have the same biological sex. Rather, power differentials appear to be based on a range of other partner attributes and couple dynamics. For example, Harry found gay men who were older and wealthier than their partners usually had greater power in the relationship (Harry & DeVall, 1978). Income differentials have also been found to predict power differentials in lesbian couples, albeit less consistently across different studies (Peplau & Fingerhut, 2007).

An important weakness of the existing research examining gender differences in reactivity to conflict is the lack of studies directly comparing same-sex and heterosexual couples (with some notable exceptions, such as Roisman et al., 2008), and the fact that these studies have not attempted to disentangle the contributions of gender *and* power. Another weakness is the fact that most studies focus on individuals' *own* perceptions of power in their relationship, without taking into account the corresponding perceptions of the partner. The present research fills these gaps in the literature. A particular strength of this research is its focus on HPA axis reactivity to couple conflict, given that this physiological system is highly sensitive to issues of status and power, as outlined below.

HPA Axis and Power

The HPA axis is considered one of the primary mechanisms through which negative affective experiences "get under the skin" to influence long-term health. This hormonal response system is activated when a stressor is experienced, signaling neurons in the periventricular nucleus (PVN) of the hypothalamus to secrete two peptides, vasopressin and corticotropin- releasing hormone (CRH). Both the vasopressin and CRH travel through the hypophyseal portal and signal the anterior lobe of the pituitary gland to release adrenocorticotropin hormone (ACTH) into the bloodstream. ACTH is carried through the peripheral circulation system, eventually reaching the adrenal cortices, where it signals the release of glucocorticoid hormones, primarily cortisol, into the blood stream. Cortisol has multiple effects on the body that facilitate the ability to respond to stressors. It plays a central role in learning, memory, and emotion, regulation of glucose metabolism, and regulation of inflammatory responses and lymphocyte maturation in the immune system (Sapolsky, Romero, & Munck, 2000). Despite the importance of cortisol release for adequate stress mobilization, high and sustained levels of cortisol contribute to disease pathogeneses. Chronically high levels of cortisol have been linked with depression and cognitive impairments (Lupien et al., 2005), the development and/or progression of medical conditions such as cancer, arthritis, diabetes, and hypertension (Heijnen & Kavelaars, 2005; Sephton & Speigel, 2003), obesity (Epel et al., 2000), fatigue (Bower, Ganz, & Aziz, 2005), as well as hippocampal cell loss (McEwen, 2000).

The HPA axis appears particularly reactive to stressors that involve issues of interpersonal status, specifically experiences of *social threat* that pose challenges to an individual's social self, social esteem, or social status (Dickerson & Kemeny, 2004).

Laboratory stressors that elicit social threat typically evoke the highest levels of HPA activation, especially when these stressors are also perceived as uncontrollable (Dickerson & Kemeny, 2004). Several researchers have noted relationship conflict represents a paradigmatic form of social threat, consistent with the fact that relationship conflict is typically associated with heightened HPA reactivity (Miller, Chen, & Zhou, 2007; Robles et al., 2006; Saxbe & Repetti, 2010). Relationship conflict is often perceived as uncontrollable, likely contributing to its potential to elicit HPA activity (Miller, Chen, & Zhou, 2007; Robles et al., 2006).

Low-power individuals in romantic relationships should be particularly likely to experience social threat during relationship conflict, and accordingly show heightened HPA reactivity, yet few studies have investigated this question. Smith, Brown, and colleagues have shown associations between partners' dominance and submissiveness in their romantic relationship and their *cardiovascular* reactivity to conflict (Brown & Smith, 1992; Brown, Smith, & Benjamin, 1998; Smith et al., 1998). Loving and colleagues (2004) showed that among 72 newlywed couples, less powerful spouses displayed elevated ACTH in response to conflict discussions, independent of gender. However, this study operationalized a very specific form of power: "dependent love"; hence, it is unknown whether more conventional forms of power differentials within a relationship would yield similar findings.

None of the previous studies examining power and physiological reactivity to conflict have included same-sex couples. As noted earlier, comparison of same-sex and heterosexual couples provides an ideal context for determining the independent contributions of gender and power to physiological reactivity to conflict. Another

important reason for studying same-sex couples is to examine whether their marginalized status in society has implications for their reactivity to conflict. Keltner and colleagues (2003) argued that individuals who are consistently in positions of low power have a higher likelihood of perceiving the world as a rejecting place and can become hypervigilant for punishment or rejection, regardless of whether such threats actually exist. This may translate into long-term health risks, given that chronic exposure to social threat may lead to heightened activation and poor recovery of the HPA system. Given that sexual minorities experience increased rates of stigma and discrimination in contemporary society, and lower social status (Herek, 2009), they are at risk for chronic experiences of social threat, and hence elevated HPA reactivity. Notably, research on other minority groups, such as African Americans, has shown they exhibit increased cardiovascular and neuroendocrine psychophysiological reactivity to stress, which may be attributable to their chronic experience of low status (Richman et al. 2007; Tull et al. 2005). Hence, one possibility examined in the present study is that same-sex couples might be *particularly* reactive to couple conflict, given their stigmatized status in society might render them hypersensitive to stress more generally and social threat specifically. Testing this hypothesis is important for understanding some of the unique mental and physical health challenges same-sex couples face.

The Current Study

The current study uses a sample of same-sex and heterosexual couples to investigate how individuals' HPA reactivity to, and recovery from, couple conflict relates to their gender and perceptions of power differences in their intimate relationships.

Additionally, we test whether these associations differ for same-sex versus heterosexual couples, due to the fact that same-sex couples' marginalized social status might render them differentially sensitive to experiences of social threat. A strength of our research is that we focus both on HPA activity as well as HPA recovery. Dickerson and Kemeny (2004) argued that delayed or ineffective recovery of the HPA axis after a stressful event leads to prolonged detrimental exposure to cortisol, increasing an individual's risk for the various negative health outcomes described above. Hence, we expect that higher levels of cortisol during couple conflict *and* higher levels of cortisol in the recovery period after the conflict has ended may both provide mechanisms through which power discrepancies in intimate relationships affect partners' health outcomes. Based on previous research, we tested the following hypotheses.

1. Individuals who perceive themselves to have lower power than their partners will have higher HPA reactivity and poorer recovery in response to relationship conflict, independent of their gender and their couple type (same-sex versus heterosexual).
2. Individuals in same-sex couples will have higher HPA reactivity and poorer recovery in response to relationship conflict than will heterosexual couples, independent of their gender and their perceptions of power in the relationship.
3. Couple type will moderate the association between power differentials and HPA reactivity/recovery tested in Hypothesis 1: Specifically, the association between power perceptions and HPA activity will be *stronger* among same-sex couples than heterosexual couples.

   Perceptions of power differences are operationalized in two different ways, based

on previous research. First, we assess individuals' *global* perceptions of whether they or their partner has more power in the relationship as a whole (Felmlee, 1994). Second, we assess individuals' perceptions of who takes on more *household responsibilities*. Household responsibilities (including household chores and day-to-day planning) are commonly employed as an index of power differentials inside the relationship since few enjoy taking on these burdens. Because there is a fixed amount of labor needing to be done, when one partner does more, they do so at the expense of their own free time and leisure. Hence, the higher power partner generally has fewer household responsibilities. We assess both global perceptions of power and also household responsibilities because previous research has found that two indices of power differentials show inconsistent patterns of correlation with one another, suggesting that they tap into different aspects of power within intimate relationships (Gray-Little & Burks, 1983). Hence, we plan to test our hypotheses separately for each power index in order to determine what specific forms of power difference relates to HPA reactivity to couple conflict.

Although all of our hypotheses focus on associations between individuals' HPA activity and their *own* perceptions of power differences, we also plan to examine associations involving the *partner's* perceptions. However, we do not have a priori hypotheses involving partner effects, given how little is known about how one's partner's perceptions of power differentials might be enacted in a way that can be perceived by the other person. Also, to explore the possibility that power differentials might have a broad effect on individuals' sense of social threat during the entire experimental episode (perhaps affecting HPA activity from the very beginning of the laboratory session as well as during the conflict task), we planned to conduct additional analyses relating

individuals' gender and perceptions of power to their total cortisol release during the laboratory session, or "area under the curve," a measurement which calculates the total exposure to cortisol during the experimental session, by taking into account the baseline, stress, and recovery measures as well as the length of time between each measurement (Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003). Finally, although our hypotheses do not specifically differentiate between female-female and male-male couples, we plan to conduct ancillary analyses to determine whether any of the hypothesized effects of interest appear to differ for these couple types.

METHODS

Participants

Our sample consisted of 120 couples: 41 male-male couples, 40 female-female couples, and 39 heterosexual couples. Relationship length ranged from 6 months to 28 years (*M*=3.9 years, Median = 2.4 years, *SD* = 4.4 years). On average, relationship length reported by gay couples (*M*=3.3 years, *SD* = 3.7) and lesbian couples (*M*=2.7 years, *SD* = 2.2) were shorter than heterosexual couples (*M*=5.7 years, *SD* = 5.8). In all, 77% of heterosexuals, 76% of lesbians, and 67% of gay men reported having made a lifelong commitment to their partner. Also, 66% of heterosexuals, 17% of gay men, and 10% of lesbians reported having made some form of legal commitment to their partner.

On average, participants were 28.9 years old (*SD* = 7.5, range = 18-65 years) and self- identified as Caucasian (84%), Latino (6%), multiracial (5%), Asian American (2%), Native American (1%), or African American (less than 1%), with 4 participants declining to state ethnicity. Regarding income, 42.2% of participants reported a yearly household income between $20,000-$50,000, with smaller numbers reporting a yearly household income of under $20,000 (24.1%) or over $50,000 (33.8%). 39% of heterosexual couples, 35% of lesbian couples, and 7% of gay male couples reported having children. More than half of each group (53.8% of heterosexuals, 62.5% of lesbians, 63.4% of gay men) reported no religious affiliation. In all, 27% of heterosexual, 15% of gay men, and 13% of lesbians endorsed affiliation with The Church of Jesus Christ of Latter-day Saints

(LDS), the dominant religious group in the region where the study was conducted.

Couples were recruited through advertisements in local periodicals, CraigsList, and Facebook. Additional recruitment of same-sex couples took place at the Salt Lake City LGBT Pride Festival. All couples that expressed interest in the study filled out a brief survey asking basic demographical and contact information. To be eligible, couples had to have been together for at least 6 months and have no major cardiovascular or neuroendocrine conditions. Those who agreed to participate completed the informed consent process, and all study procedures, at our University of Utah laboratory.

Procedure

After informed consent, participants completed a series of questionnaires. Afterwards, they were seated in a comfortable room, equipped with video cameras, and attached to physiological assessment equipment. Then they rated their liking of landscape photographs for 3 minutes (Jennings, Kamarck, Stewart, & Eddy, 1992). Following standard practices for assessments of couple conflict (Heyman, 2001; Kerig & Baucom, 2004), participants "warmed up" with a neutral discussion of the events of their respective days for 10 minutes. Next, each participant was given a form and asked to list five topics of common disagreement between them, to indicate the frequency, contentiousness, and importance of each issue, and to indicate who in the relationship is more responsible for the problem. The experimenter then examined both partners' responses and selected two topics rated as highly important, frequent, and difficult to resolve: one in which both partners thought that Partner A bore more responsibility and one in which both partners thought that Partner B bore more responsibility. The

experimenter briefly reviewed the selected topics with the couple to confirm the importance of the topics and the couple's willingness to discuss them.

The couple discussed each topic for 8 minutes, attempting to reach resolution. Hence, the conflict task lasted approximately 16 minutes. To promote recovery from the conflict discussion, participants then discussed a recent positive experience with one another for 5 minutes. The entire visit took between 2 and 3 hours. At the end of the assessment each partner was paid $70.

Measures

Power Inside the Relationship

Household responsibilities. Cowan and Cowan's (1990) *Who Does What* scale was used to measure partners' division of household chores and responsibilities. For each domain, participants rate on a scale from 1 to 9 their distribution of responsibility (1 = *my partner does it all*, 5 = *we both do it all*, 9 = *I do it all*). Examples of domains assessed include house cleaning, meal preparation, paying bills, making decisions about finances, maintaining contact with friends and family, etc. For this study, we did not assess child care activities, given the low rate of parenting in the sample as a whole. Cronbach's alpha for this 18-item scale was .77.

Relative perception of power. Following Felmee (1994), participants rate on a scale from1 to 9 their perception of who has more power or influence in their relationship (1 = *Mostly my partner*, 5 = *We are about equal*, 9 = *Mostly me*). Greater scores indicate greater relative power.

HPA Activation

We assessed HPA activity by measuring participants' salivary cortisol at three points during the experimental session (baseline, conflict task, recovery). Because it takes approximately 20 minutes for cortisol levels in the brain to be detectable in saliva, we timed the cortisol collection so that it occurred 20 minutes after the participant's initial adjustment period to the laboratory, when they were filling out questionnaires, 20 minutes after the end of the conflict discussion, and 40 minutes after the end of the conflict. All samples were taken using Salivettes (Sarstedt, Germany), consisting of a plastic tube with a cotton insert. At the laboratory, samples were kept frozen at -25 Celcius until being shipped on dry ice to be assayed by the laboratory of Dr. Clemens Kirschbaum at the Technical University of Dresden, which uses a time-resolved immunoassay with flurometric end point detection (Dressendorfer, 1992). Cortisol is represented in nanomoles per liter (nmol/L). Following established guidelines (Smyth, 1998), data points that were more than 4 standard deviations from the mean were discarded.

RESULTS

Table 1 lists the means and standard deviations of all relevant study variables. In addition to baseline, stress, and recovery cortisol, this table represents the degree of cortisol reactivity (stress cortisol minus baseline), and recovery (recovery cortisol minus baseline), as well as total cortisol release (AUC).

Table 2 presents the zero-order correlations of all relevant study variables. Age was not related to any variables of interest. Each person's self reported levels of both relative power and household responsibilities were positively correlated. Power measurements within the couple were inversely correlated, such that individuals with higher perceived power or higher household responsibilities had partners with lower perceived power or lower household responsibilities. Neither of power indices related to individuals' own or their partner's cortisol levels.

Analytic Strategy

Approximately 7% of the participants had missing data for at least one variable. Comparisons between individuals with missing vs. complete data revealed no systematic differences, suggesting that it was reasonable to treat the data as missing at random. Accordingly, we used the multiple imputation procedures available within SPSS (versions 17.0 and greater) to impute the missing data. SPSS 17.0 uses fully conditional specification to specify and generate plausible values for missing data, based on the

hypothetical joint distribution of the data. FCM specifies the multivariate model through a series of conditional models, one for each variable in the model. This results in the production of a number of complete data sets, each of them slightly different, in which the missing values are replaced by values that can be thought of as random draws from a distribution of plausible values. Simulation studies indicate that the more data sets that are generated, the better that the procedure performs in providing an adequate approximation of the original data. Accordingly, we generated 20 data sets. Analyses are conducted separately with each data set and the resulting parameters are pooled across each set. This pooling procedure combines the variation within and across the different imputed data sets, and estimates using this procedure translate the error variation introduced by the missing data into the width of the confidence interval (van Buuren, 2007). These procedures are known to provide more statistically valid results than listwise or casewise deletion (Schafer & Graham, 2002).

All analyses used the Actor-Partner Interdependence Model, or APIM (Cook & Kenny, 2005; Cook & Snyder, 2005; Kenny, Kashy, & Cook, 2006), implemented with a multilevel regression model within the SPSS mixed procedure. This procedure (which is comparable to the SAS Proc Mixed procedure, Campbell & Kashy, 2002) is an expansion of the general linear model, which allows for correlated and nonconstant variance. Hence, it allows for the retention of individual participant scores, but treats each participant as nested within a couple, and accounts for the nonindependence of responses within each couple. A key characteristic of the APIM is that individual outcomes are modeled as a function of one's own responses on the IVs (denoted actor effects) as well as one's partner's responses (denoted partner effects). Using the mixed modeling

procedure, estimates of these effects control for the correlations between these variables and between the residuals (Cook & Kenny, 2005). Models were calculated separately for the three cortisol parameters of interest: cortisol reactivity to the conflict task, cortisol recovery from the conflict task, and total cortisol release across the lab visit ("area under the curve," denoted AUC). The reactivity and recovery models took the following form (in this example, cortisol during the conflict task is the outcome; for the recovery model, cortisol during the recovery episode was the outcome):

*Task Cortisol = Baseline Cortisol+ Discussion Order + Age + Gender + Couple Type + Relative Power + Partner's Relative Power + Gender*Relative Power + Gender*Partner's Relative Power +Couple Type*Relative Power + Couple Type*Partner's Relative Power*

The model for AUC was identical, but did not control for baseline cortisol (since baseline cortisol is incorporated into the AUC measure). Recall that the conflict task involves two discussions: one in which both partners thought that Partner A bore more responsibility and one in which both partners thought that Partner B bore more responsibility. Hence, for each couple one partner was "the responsible party" at the very beginning of the conflict, whereas the other partner was "the responsible party" only for the second half of the conflict. The dichotomous variable "Discussion Order" represents this dimension, with the higher score indicating the partner who was the responsible party *first* (follow-up analyses found that Discussion Order did not interact with any other effects in the models). Couple type refers to whether the couple is same-sex or other-sex, and is effect coded so that -.5 is heterosexual and .5 is same-sex. Gender is also effect coded so that females are .5 and males are -.5. For each cortisol parameter, separate models were

estimated to analyze the contributions of relative power and household chores/decisions, both of which were standardized before entry into the model. Nonsignificant interaction terms were deleted from all final models. The results of all regressions are reported in Table 3. We conducted ancillary tests for interactions between gender and couple type, in order to explore potential differences between female-female and male-male couples, and no significant effects were detected. Hence, none of the reported effects of same-sex couple type were found to differ between male-male and female-female couples.

HPA Reactivity to Conflict

Contrary to Hypothesis 1, there was no significant association between HPA reactivity to conflict and one's own power. Rather, there was a main effect of gender, such that women had significantly higher HPA reactivity, b=.58, p=.014, and an interaction between gender and the *partner's* relative power, b=-.40, p=.049. Simple slope tests indicated that among individuals whose partners reported having low power in the relationship (i.e., 1 SD below the mean), females had higher HPA reactivity to the conflict task than did males, b=.89, p=.003, but this was not the case among individuals whose partners reported having high power in the relationship (i.e., 1 SD above the mean), as shown in Figure 1. Consistent with Hypothesis 2, individuals in same-sex couples had greater HPA reactivity to the conflict than heterosexual couples, albeit only at the trend level, b=-.44, p=.076 (follow-up analyses found no differences between female-female and male-male couples). Contrary to Hypothesis 3, couple type did not interact with power perceptions to predict HPA reactivity.

HPA Recovery from Conflict

As with conflict reactivity, there was no association between power perceptions and HPA recovery, contrary to Hypothesis 1, and instead there was a main effect of gender. Specifically, women showed poorer recovery from the conflict task (i.e., elevated HPA levels 20 minutes after the task), b=.72, p=.002. Consistent with Hypothesis 2, same-sex couples showed poorer HPA recovery from the conflict task, b=.59, t=2.45, p=. 014. HPA recovery levels were lower (indicating more effective recovery) among partners who were the "responsible party" for the first half of the conflict task, b=.49, p=.035. No significant interactions were found between couple type and power perceptions, contrary to Hypothesis 3.

Given that the pattern of findings was similar for conflict reactivity and conflict recovery, we recomputed the recovery analyses and controlled for HPA levels during the conflict to determine whether the recovery effects represented a carryover of elevated reactivity during the conflict. When controlling for HPA reactivity to the conflict, we still found that women showed poorer conflict recovery (i.e., elevated HPA levels after the conflict was over) , b=.46, t=2.32, p=.02. This analysis found that same-sex couples still showed poorer conflict recovery, but this effect was now at the trend level, b=.36 p=.08. This indicates that the gender and couple type effects we detected for conflict recovery are not simply attributable to the higher levels of conflict reactivity that women and same-sex couples started out with.

Total Cortisol Release: AUC

We found a significant association between AUC and one's *partner's* report of household responsibilities. Specifically, individuals whose partners reported taking on fewer household responsibilities had significantly higher HPA activity across the laboratory visit, b=-30.4, p=.021. Although this finding was not predicted, it is consistent with the reasoning of Hypothesis 1 (in which lower-power individuals' experience more social threat and hence greater HPA activity). Additionally, individuals who were the "responsible party" for the first half of the conflict task had higher cortisol levels across the laboratory visit than partners who were the "responsible party" for the second half of the conflict task, b=77.9, p=.001**.** Given the difference between the pattern of findings for AUC and the pattern of findings for HPA reactivity and recovery, we computed an additional analysis using baseline HPA activity as the outcome variable to investigate the possibility that the inclusion of baseline cortisol in the AUC measure might be responsible for the detected pattern of AUC effects. Specifically, did individuals whose partners took on fewer household responsibilities have elevated HPA activity at baseline? In fact, this was the case, b=.-.59, p=.03. We then recomputed the AUC model after controlling for baseline cortisol, and found that in this model, partner's household responsibilities were no longer significantly related to AUC. This indicates that the AUC effect for partner's household responsibilities is attributable to the fact that individuals whose partners take on few household responsibilities have elevated *baseline* levels of HPA activity, but not elevated responses to conflict (consistent with the findings of our reactivity and recovery models).

Table 1.

Means and Standard Deviations for Study Variables

Variables	Mean	SD	Range
Household Labor/Maintenance	3.1	.5	(1.6, 5.2)
Relative Power	4.9	2	(1, 9)
Baseline Cortisol	4	3.2	(.7, 24.5)
Stress Cortisol (20 minutes after conflict discussion began)	3	3.9	(.2, 52)
Recovery Cortisol (20 minutes after conflict discussion ended)	-1.1	2.3	(-14.5, 9.3)
Total Cortisol Release (area under the curve)	199.7	186.6	(30.9, 1949.7)
Cortisol Reactivity (stress cortisol minus baseline)	-.9	3.2	(-12.8, 39.4)
Cortisol Recovery (recovery cortisol minus baseline)	2.9	2.6	(.4, 18)

Table 2.

Correlations Among Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.
1. Age								
2. Individual's Relative Power	-.05							
3. Individual's Household Labor/Maintenance	.06	.26**						
4. Partner's Relative Power	-.03	-.25*	-.19					
5. Partner's Household Labor/Maintenance	-.12	-.19	-.63**	.26**				
6. Baseline Cortisol	-.03	.002	.003	-.04	-.08			
7. Cortisol Reactivity (stress minus baseline)	-.08	.07	.03	-.04	-.05	.6**		
8. Cortisol Recovery (recovery minus baseline)	-.1	.02	-.002	.03	.01	.7**	.71**	
9. Baseline SCL	-.08	.05	.017	-.04	-.06	.82**	.94**	.83**

**. Correlation significant at the 0.01 level.

*. Correlation significant at the 0.05 level

Table 3.

Results of Regression Models Predicting Cortisol Reactivity, Cortisol Recovery, and Total Cortisol Release (AUC)

Cortisol Reactivity	**b**	**SE**	**95% CI**
Intercept	-.41	.47	(-1.3, .51)
Discussion Order	.61	.41	(-.19, 1.4)
Baseline Cortisol	.62***	.04	(.54, .7)
Age	-.16	.11	(-.37, .05)
Gender	.58*	.24	(.11, 1)
Couple Type	.44	.25	(-.05, .93)
Individual's Relative Power	.08	.12	(-.15, .31)
Partner's Relative Power	.01	.11	(-.2, .23)
Gender x Partner's Relative Power	-.4*	.2	(-.79, -.01)

Cortisol Recovery	**b**	**SE**	**95% CI**
Intercept	-.15	.33	(-.8, .5)
Discussion Order	-.49*	.23	(.04, .94)
Baseline Cortisol	..55***	.03	(.49, .6)
Age	-.22*	.11	(-.43, -.01)
Gender	.72*	.23	(.27, 1.2)
Couple Type	.59*	.24	(.12, 1.1)

Total Cortisol Release (AUC)	**b**	**SE**	**95% CI**
Intercept	76.9*	31.6	(15.5, 138)
Discussion Order	77.9***	23.6	(31.8, 124.1)
Age	-9.9	10.5	(-30.6, 10. 7)
Gender	20.3	21.6	(-22.1, 62.7)
Couple Type	33.9	22.6	(-10.5, 78.3)
Individual's Household Labor/Maintenance	-16.7	12.6	(-41.4, 7.9)
Partner's Household Labor/Maintenance	-30.4*	13.2	(-56.3, -4.6)

***. Correlation significant at the < 0.01 level.

**. Correlation significant at the 0.01 level.

*. Correlation significant at the 0.05 level.

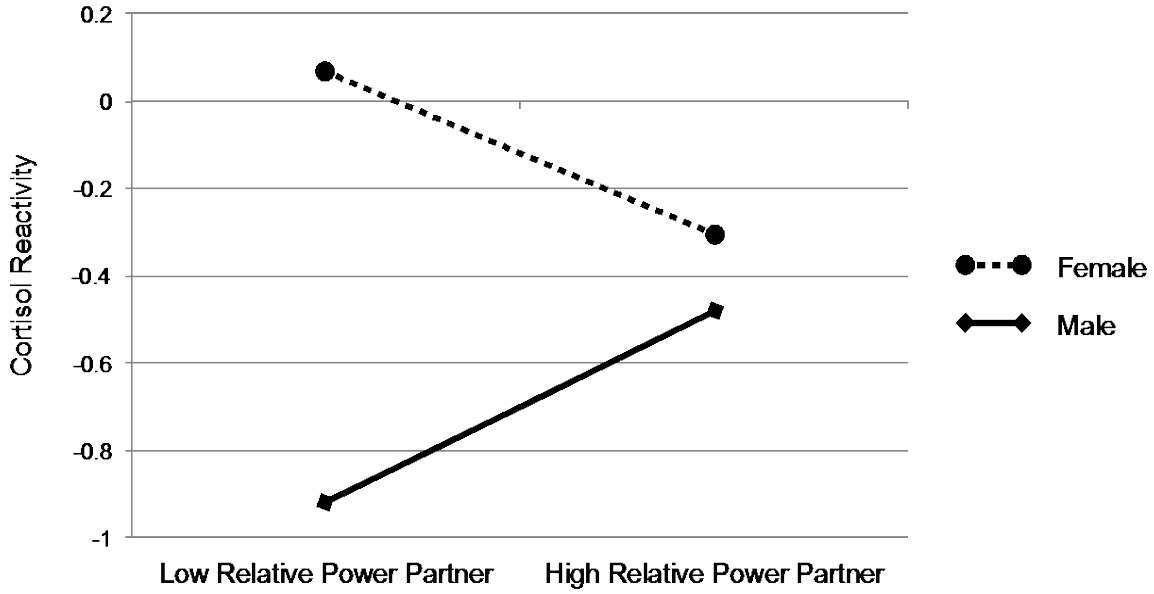

Figure 1. Simple Slope Tests of HPA Reactivity to Conflict

DISCUSSION

This study investigated whether previously-documented gender differences in individuals' neuroendocrine reactivity to couple conflict are actually attributable to power differences, measured in terms of partners' perceptions of global power differences in their relationship and also measured with respect to distribution of household responsibilities. The results show that gender differences are *not* explained by power differences. Similar to previous research, we found that women in both same-sex and heterosexual couples showed greater HPA reactivity to conflict and poorer HPA recovery from conflict, independent of their perceptions of power in their relationship. The only domain in which power perceptions, but *not* gender, explained differences in HPA activity concerned baseline HPA (such that individuals whose partners reported taking on fewer household responsibilities had greater baseline HPA activity). Hence, these results indicate that power differentials may relate to individuals' *tonic* HPA activity, but gender relates to individuals' HPA reactivity to and recovery from conflict. The fact that we found gender differences (mirroring the patterns found in previous research) in a sample that included same-sex couples, and after controlling for individuals' perceptions of power, provides important new evidence for the robustness of gender differences in neuroendocrine reactivity to couple conflict, and adds to the growing body of literature suggesting gender differences in the health implications of romantic relationship

processes. Also, we found that gender differences in HPA reactivity to conflict are moderated by one's *partner's* perceptions of relative power in the relationship. Specifically, among individuals whose partners reported having low power, women showed greater HPA reactivity than men, but this gender differences was not observed for individuals whose partners reported having high power. This unexpected finding raises new and important questions about the way in which women and men interpret and experience their own and their partner's power within intimate relationships. Finally, we also found that same-sex couples had significantly higher HPA levels in response to the conflict (albeit at the trend level) and during recovery from the conflict (independent of their elevated reactivity levels), consistent with our expectations that same-sex couples might be hyperactive to experiences of social threat (such as relationship conflict) due to their chronic exposure to social marginalization (Meyer, 2003).

Gender Differences in HPA Response to Conflict Are Not Attributable to Power Differences

Studies have reliably found that women experience greater HPA reactivity and poorer recovery following relationship conflict compared to men (Kecolt-Glaser & Newton, 2001; Morell & Apple, 1990; Smith et al., 1998). Because women have historically had less social-structural power than their male partners, it has been theorized such findings may be related to power inequalities inside the relationship rather than aspects intrinsic to gender (Wanic & Kulic, 2011). In accordance with this theory, we hypothesized that individuals who perceived themselves to have lower power than their partners would have higher HPA reactivity and poorer recovery in response to

relationship conflict, independent of their gender and their couple type (same-sex versus heterosexual). This was not found to be the case. Instead, our findings mirrored previous research by showing that women experienced greater HPA reactivity and poorer HPA recovery from relationship conflict compared to men. Unique to this study, such increased HPA responses to conflict among women were shown to appear in both heterosexual and same-sex couples. This demonstrates that women's greater reactivity is not attributable to a male-versus-female difference *within their relationship,* but instead their status as women *in general*. This provides robust evidence that gender differences in HPA responses to conflict are not simply attributable to the gender dynamics of male-female couples (in whom most of the previous research on gender differences in neuroendocrine reactivity to couple conflict has been conducted). In addition, the gender differences we detected remained significant while controlling for individual's *and* their partner's reports of relative power inside the relationship.

A notable component of our study is the examination of HPA recovery from conflict, as well as HPA reactivity. Again, we found notable gender differences. Even after controlling for HPA levels during the conflict task, women were shown to have poorer HPA recovery to relationship conflict regardless of couple type. This indicates that the gender effects we detected for conflict recovery are not simply attributable to higher levels of conflict reactivity. Rather, these represent *separate and independent* gender-related effects. Dickerson and Kemeny (2004) argued for the importance of independent assessments of HPA recovery, noting that delayed or ineffective recovery of the HPA axis after a stressful event leads to prolonged exposure to cortisol, increasing an individual's risk for the various negative health outcomes. The results from this study

suggest that women may be at increased risk for negative health outcomes through two separate pathways, greater HPA reactivity to relationship conflict *and* poorer HPA recovery after the conflict.

How Does Power Matter?

Although gender differences in HPA response to conflict are not attributable to power differences, power inside the relationship remains relevant. An interaction effect was found between gender and partner's reports of relative power showing that women had higher HPA reactivity during the conflict task than did males, but only in cases where their partner perceived that he/she had average or low power. Women whose partners perceived themselves to have high power did not show greater HPA reactivity than men whose partners perceived themselves to have high power. One possible explanation for this unexpected pattern of gender differences may be that we still have a society in which men are expected to occupy higher power roles. Some research on heterosexual couples suggests that women may feel out of place occupying high power positions than their male romantic partners: Specifically, studies have found that women who earn more than their husbands often compensate for their "gender-deviant" success by taking on a greater share of the household responsibilities (Bittman et al. 2003; Greenstein, 2000). In related research, women who have gender-atypical occupations have been shown to spend more time on female-typed housework when at home (Schneider, 2012). Our findings suggest that these effects are partially attributable to the manner in which a woman's power in the relationship is perceived *by her partner.* We did not find that women's HPA reactivity was related to their perception of their *own* power with respect to their partners; rather,

we found heightened reactivity among women *whose partners* reported having low power. Perhaps, then, women's socialization leads them to expect (consciously or unconsciously) that they will be the lower-power partner in their relationship. When this expectation is violated by the partner's perception of low power, this may contribute to the aversive nature of couple conflict for women. Yet it is not clear exactly why this effect should only be observed with respect to the partner's perceptions of power, and not one's own. One possibility is that women's relational orientation may lead them to be more sensitive to and aware of a partner's perception of his/her power status. Hence, perhaps the reason that women whose partners perceive themselves to have low power are more reactive to conflict than men whose partners perceive themselves to have low power is that women are better able to detect their partner's power perceptions. Future research can examine this possibility by asking women and men to report their own power perceptions *and* to predict how they think their partner would respond, and to determine whether the effects detected in the present study are moderated by an individual's conscious awareness of their partner's feelings and perceptions.

The only main effect of power found in our study was related to AUC. Individuals whose partners reported taking on relatively more household responsibilities had lower cortisol levels across the laboratory visit. As an index of power inside the relationship, those who do more household labor have historically been considered to have less power. In this circumstance, the higher power partner, defined as the one with fewer household responsibilities, had lower cortisol levels. Although this finding partially supported our first hypothesis, further analyses revealed this effect was driven entirely by baseline levels of HPA response. When we recomputed the AUC model to control for baseline

cortisol, the partner's household responsibilities were no longer significantly related to AUC, showing that the AUC effect for partner's household responsibilities is attributable to the fact that individuals whose partners take on fewer household responsibilities, and who therefore have a lower power position than their partners, have elevated *baseline* levels of HPA activity, but not elevated responses to conflict. This suggests that chronic experiences of taking on greater household burdens in a relationship may affect tonic HPA functioning, emphasizing an additional risk factor for negative health outcomes associated with having low power in one's intimate relationship. The fact this effect is predicted by the partner's reports of household responsibilities instead of the individual's own report increases confidence the effect relates to actual household burdens, as opposed to distorted perceptions of household burdens. If the effect were due to the fact that individuals with heightened HPA reactivity were disproportionately likely to perceive themselves as being overburdened, one would expect an association with their own report of household responsibilities and *not* with their partner's report, when in fact we found the opposite. This highlights the importance of measuring power in the relationship from the perspective of both partners instead of only one.

HPA Responses to Conflict in Same-Sex Couples

As predicted, same-sex couples (both female-female and male-male) showed greater HPA reactivity to conflict (albeit at the trend level) and also poorer HPA recovery from conflict (independent of the reactivity effect). The finding for HPA recovery is particularly notable, given that this is the first study to examine same-sex couples' neuroendocrine recovery from relationship conflict. The fact that the effect of couple

type was independent of individuals' (and their partners') perceptions of power in the relationship is also notable, given that it indicates that these effects are not attributable to power dynamics that might be unique to same-sex couples. Rather, these findings are consistent with the notion, discussed earlier, that sexual minorities might be disproportionately reactive to the stress of relationship conflict because of their exposure to the chronic stress of social marginalization (Herek, 2009). Dickerson and colleagues (2004) provide compelling evidence that the HPA axis is particularly sensitive to threats to the social self, social esteem, or social status. Hence, because sexual minorities *regularly* experience social threats such as stigmatization, invalidation, and discrimination, they should show heightened HPA reactivity and poorer HPA recovery to the stress of couple conflict, and our study provides evidence in support of this view. This finding is particularly notable given the increasing evidence that gay, lesbian, bisexual, and transgendered individuals have poorer mental and physical health than heterosexual individuals across a variety of different domains, and across the life course (Institute of Medicine, 2011), which have been attributed to their marginalized social status. The present study suggests that the detrimental effects of social marginalization may extend to sexual minority individual's feelings, behaviors, and physiological reactivity *within their own intimate relationships*. Hence, even sexual minority individuals with highly loving and supportive partners may not be buffered from the potential "carryover" stress associated with social marginalization. Yet importantly, same-sex couples do not appear to be differentially sensitive to power differentials *within* their relationships. We predicted the association between power differentials and HPA reactivity would be stronger among same-sex couples than heterosexual couples, but this

was not the case (and ancillary analyses found no differences between male-male and female-female couples in this regard). Hence, even though same-sex couples have been shown to value power equality in their romantic relationships more than heterosexual couples (Peplau & Cochran,1980; Peplau & Fingerhut, 2007), this does not appear to manifest itself in a heightened association between power differentials and HPA reactivity to conflict among same-sex couples.

Limitations and Directions for Future Research

Potential limitations of this study include the fact that our sample was disproportionality Caucasian, reflecting the specific demographics of the state in which our data was collected. Future research should include greater diversity in their sample to correct for the limitation, and in order to examine how social marginalization on the basis of ethnicity relates to HPA reactivity to couple conflict. Additionally, measurements of both indexes of power were self-report, creating a potential for bias. Observational data on the different ways in which power might be manifested in day-to-day household functioning would increase the reliability of measurements of power, and would make important contributions to understanding the importance of "actual" versus "perceived" power differentials. Consider, for example, the unexpected finding that individuals' perceptions of their relative power in the relationship was positively correlated with their household responsibilities, suggesting that individuals who perceived themselves as having greater relative power were *also* more likely to report taking on a higher levels of household burdens. This is surprising, because household labor is traditionally considered a marker of low power. As gender and relationship norms and expectations

continue to change with each generation, additional research is needed to assess how couples arrive at their current division of household responsibilities, how they think these household behaviors relate to power, and the multiple other domains that contribute to their power perceptions. Another domain for future research concerns additional measurements of tonic physiological functioning. We found that perceptions of power related to individuals baseline HPA functioning, whereas gender related to HPA responses to conflict. Future research should seek to replicate these findings by examining other measures of tonic HPA functioning, such as awakening cortisol levels and cortisol levels over the course of the whole day. Such research would contribute to our understanding of the long-term health implications of intimate relationship functioning.

Conclusion

The present study examined whether previously documented gender differences in individuals' HPA reactivity and recovery from relationship conflict are actually attributable to power differences, measured with respect to partners perceptions of relative power in their relationship as well as perceived distribution of household responsibilities. The results show that gender differences in HPA responses to couple conflict are not explained by power differences. Similar to previous research, we found that women in both same-sex and heterosexual couples showed greater HPA reactivity to conflict and poorer HPA recovery from conflict, independent of their perceptions of power in their relationship. The only domain in which perceptions of power, but not gender, explained differences in HPA activity concerned baseline HPA. Specifically,

individuals whose partners reported taking on fewer household responsibilities had greater baseline HPA activity. This suggests that power differentials may relate to individuals' tonic HPA activity, while gender relates to individuals' HPA reactivity to conflict. The fact that we found these gender differences in a sample that included same-sex couples, while controlling for individuals' perceptions of power, provides robust evidence for gender differences in neuroendocrine reactivity to couple conflict. We also found that same-sex couples had significantly higher HPA reactivity to relationship conflict and poorer HPA recovery from conflict, consistent with our expectations that same-sex couples might prove to hyperactive to experiences of social threat (such as relationship conflict) due to their chronic exposure to social marginalization (Meyer, 2003). Collectively, these findings make an important contribution, to the growing body of literature on the mechanisms through which experiences in close relationships shape long-term health, and how these effects differ as a function of gender ***and*** sexual orientation.

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